

CASE REPORT

An accidental attachment of *Elthusa raynaudii* (Isopoda, Cymothoidae) in *Etmopterus* sp. (Squaliformes, Etmopteridae)

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Abstract

A female *Elthusa raynaudii* was found attached on the roof of the mouth facing inward in a lantern shark, *Etmopterus* sp. in Taiwan. This was backwards to all known cymothoid attachments in the mouths of fishes. This isopod naturally occurs in the gill chamber of fishes. The attachment must have occurred accidentally. This is only the fourth time this isopod has been collected in the northern hemisphere and the first for Taiwan and this host.

Keywords

Accidental attachment, *Elthusa raynaudii*, lantern shark, *Etmopterus* sp., northern hemisphere

A number of cymothoid isopods reside in the mouths of fishes; however, all of these orient with their heads facing out of the mouth of their fish host (Bunkley-Williams and Williams 1998). Most of the females of these species attach right-side-up on the tongues of fishes. Only two species specifically attach up-side-down on the roof of the mouth of fishes: *Ceratothoa parallela* (Otto, 1828) and *Olencira praegustator* (Latrobe, 1802) (Trilles 1968, 1972; Williams and Bunkley-Williams 1999). The first species parasitizes several species of fishes (mostly sparids) in the eastern Atlantic and Mediterranean (Papapanagiotou and Trilles 2001). They also found it damages cage-cultured fishes. They summarized the cases of cymothoids attacking cage-cultured fishes, but omitted our problem with *Livoneca ovalis* (Say, 1818) and pompano, *Trachinotus carolinus* (Linnaeus, 1766) (Williams 1974); and discussed treatments for these parasites, but omitted our successful treatments with formalin (Williams 1974). The second species is genus specific to menhaden (*Brevoortia* spp.) (Clupeiformes, Clupeidae) of the Atlantic and Gulf coasts of the USA (Williams and Bunkley-Williams 1999) and was reviewed and redescribed by Trilles (2007).

One of us (DAE) obtained a specimen of lantern shark, *Etmopterus* sp. (California Academy of Science collection number CAS 227957), (Squaliformes, Etmopteridae) from a fish

market in the town of Ta-Chi in northeastern Taiwan (24°53'N, 122°01'E), which had an isopod (CASIZ 180277) attached up-side-down to the roof of the mouth of the shark (Fig. 1). The host shark, an undescribed member of the *Etmopterus pusillus* group, was a 45.6 cm TL female. Oddly, the isopod was oriented facing down the throat of the shark backward to any that has ever been reported in the mouth of a fish. When removed from the shark (Fig. 2), we found the isopod was a 44 mm long 20 mm wide female of *Elthusa raynaudii* Milne Edwards, 1840 (Isopoda, Cymothoidae). The female of this isopod has been reported in the gill chamber of a variety of fishes (Bruce 1990), but not the mouth. This gill-dwelling isopod probably was either dislodged from its natural host or abandoned the gill chamber after its host died in a trawl net. It either crawled into the mouth of the shark or the shark attempted to swallow it, in either case the isopod once inside the mouth then firmly attached itself on the roof of the mouth of the shark.

Strange attachment positions in cymothoid isopods are of interest because they may grant us insight into how diverse attachment positions originated. For example, we found an cymothoid isopod (*Anilocra acuta* Richard, 1910), which occurs on the outside of inshore fishes, in the throat of a King Mackerel, *Scomberomorus cavalla* Cuvier, 1829 (Perciformes, Scom-

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Fig. 1. Posterior end of the pleotelson of *Elthusa raynaudii* extending out of the mouth of a 45.6 cm TL female lantern shark, *Etmopterus* sp. Photograph by DAE

bridae) collected far offshore. This isopod apparently became dislodged from a prey fish and attached and survived for some time in the throat of the mackerel (Williams and Bunkley-Williams 1994). We know female cymothoids can become detached from their hosts, reattach to different hosts, and survive because we have accomplished this experimentally in the field (Williams *et al.* 1982).

In the present case, the shark expired prior to its collection so the possibility of survival of the host or isopod could not be tested. The shark was subsequently returned to the laboratory where it was photographed and preserved in 10% buffered formalin.

The isopod would appear to have occupied much of the mouth of the host possibly making feeding difficult. However, some relatively large cymothoids occupy much of the mouths of jacks (Carangidae). One of our students found jacks with isopods ate just as much as those without isopods, they just consumed different prey items (Kimmel and Arneson 1978).

Trilles and Öktener (2004) summarized unusual cymothoid associations. They listed 11 species of cymothoids, apparently rarely, reported from sharks and considered all of them to represent unusual association. *Elthusa raynaudii* has only been reported from a shark once before and this record is



Fig. 2. A 44 × 20 mm female specimen of *Elthusa raynaudii* removed from the mouth of the 45.6 cm TL female lantern shark, *Etmopterus* sp. Photograph by DAE

somewhat obscure as it was from an unknown species of shark somewhere off Japan (Gurjanova 1936). This isopod has also been found in the stomach of another small shark, possibly the Spotted estuary smooth-hound, *Mustelus lenticulatus* Philpotts, 1932, from New Zealand (Hurley 1961).

This isopod has been reported to occur widely in the southern hemisphere (Bruce 1990), but has only been noted once in Japan (Thielemann 1910), once off Japan (Gurjanova 1936), and once in Guam (Williams *et al.* 2000) in the northern hemisphere. Taiwan is a new locality record for this isopod in the northern hemisphere and the host will be a new, if accidental, record once it is described.

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